

# **ABSTRACT**

A slab-type photonic crystal arranged to reduce the coupling loss in coupling to an optical fiber and to satisfy single-mode conditions. The photonic crystal has a slab having a plurality of slab refractive index portions and vacancies formed between the slab refractive index portions. The number, shape, size and refractive index of the slab refractive index portions and the number and shape of the vacancies are selected so that when a beam of light entering the waveguide expands to a maximum extent, the size of the beam in the slab thickness direction does not exceed the slab thickness.